Tuesday, 06/21/2005

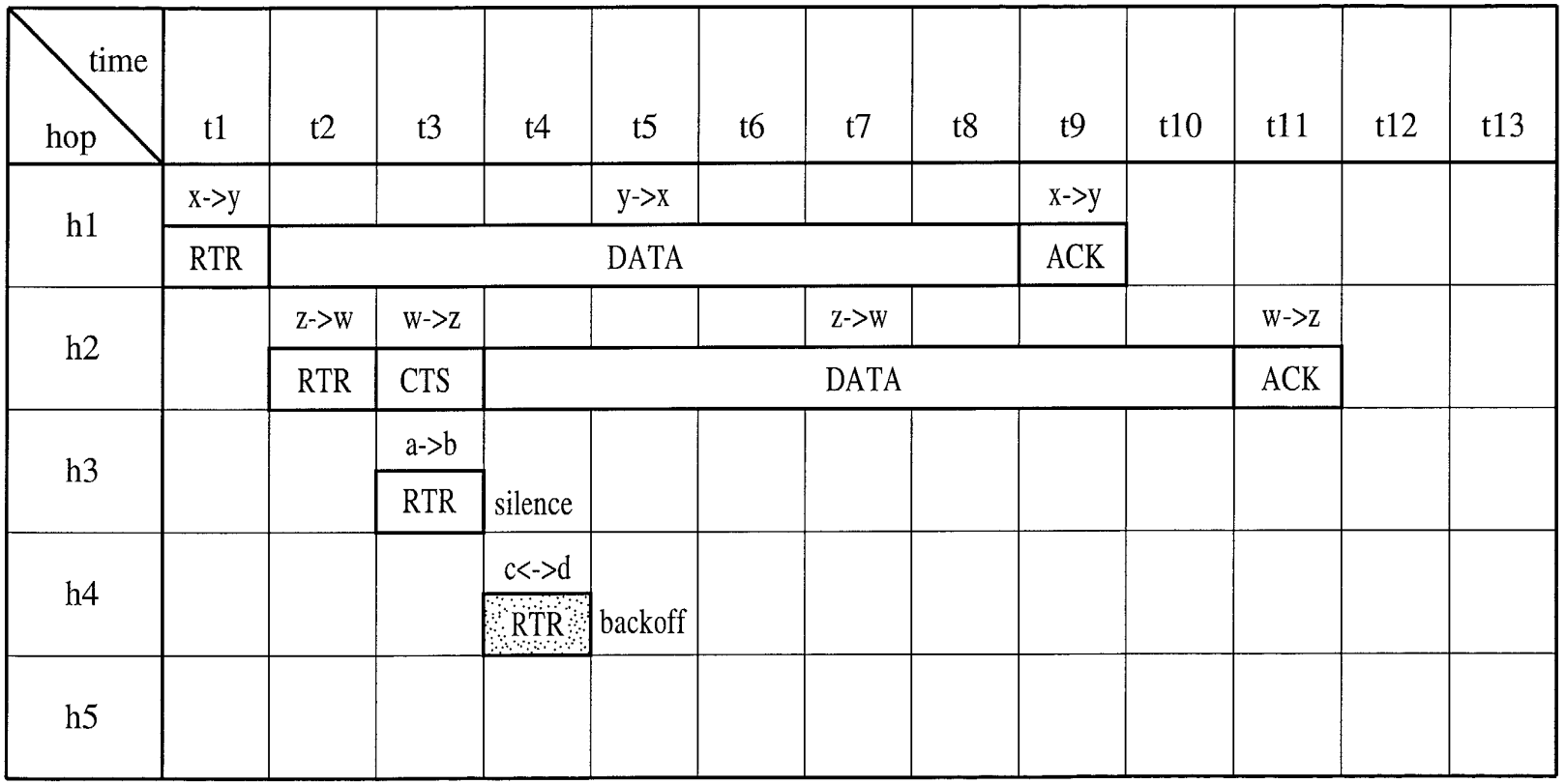

FIG. 1

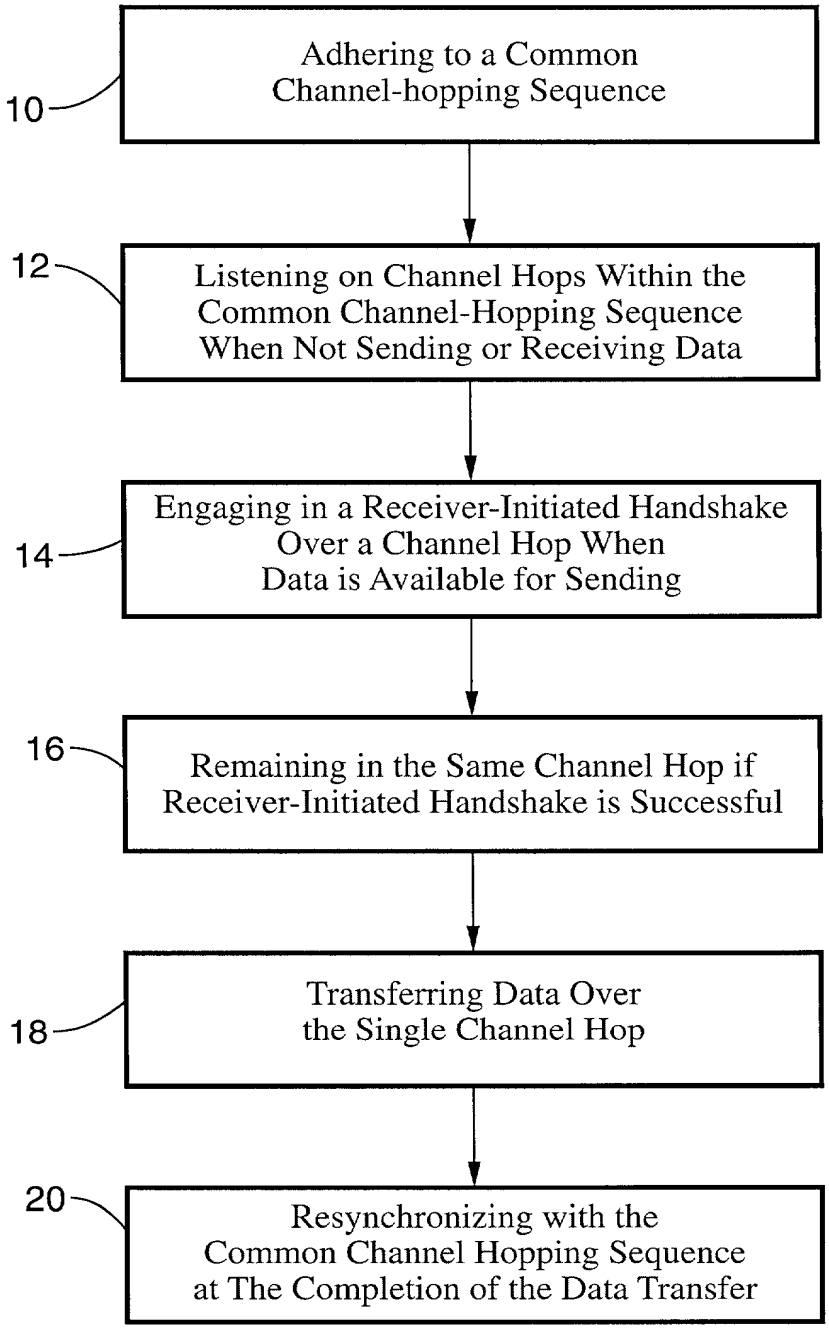
10
Adhering to a Common Channel-hopping Sequence
12
Listening on Channel Hops Within the Common Channel-Hopping Sequence When Not Sending or Receiving Data
14
Engaging in a Receiver-Initiated Handshake Over a Channel Hop When Data is Available for Sending
16
Remaining in the Same Channel Hop if Receiver-Initiated Handshake is Successful
18
Transferring Data Over the Single Channel Hop
20
Resynchronizing with the Common Channel Hopping Sequence at The Completion of the Data Transfer

FIG. 2

time / hop	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13
h1	x->y RTR								z->w DATA				
h2		x->y RTR			y->x DATA						w->z ACK		
h3			y->x DATA				z->w DATA						
h4				c<->d RTR		z->w DATA		y->x DATA					
h5		y->x DATA			z->w DATA								
h6				z->w DATA		y->x DATA							
h7			a->b RTR				y->x DATA	z->w DATA					
h8			w->z CTS	y->x DATA									
h9									x->y ACK	z->w DATA			

FIG. 3

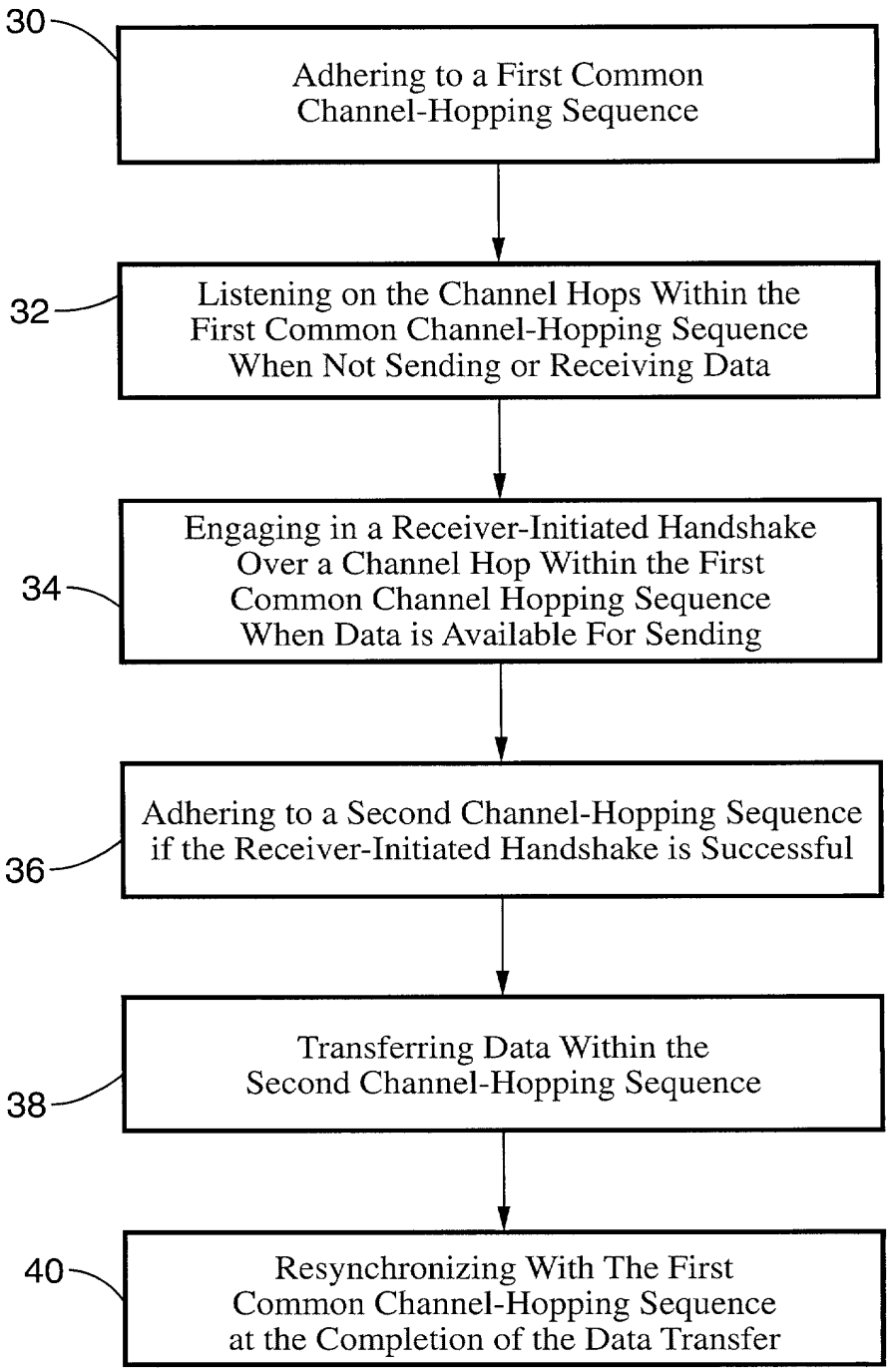
30
Adhering to a First Common Channel-Hopping Sequence
32
Listening on the Channel Hops Within the First Common Channel-Hopping Sequence When Not Sending or Receiving Data
34
Engaging in a Receiver-Initiated Handshake Over a Channel Hop Within the First Common Channel Hopping Sequence When Data is Available For Sending
36
Adhering to a Second Channel-Hopping Sequence if the Receiver-Initiated Handshake is Successful
38
Transferring Data Within the Second Channel-Hopping Sequence
40
Resynchronizing With The First Common Channel-Hopping Sequence at the Completion of the Data Transfer

FIG. 4

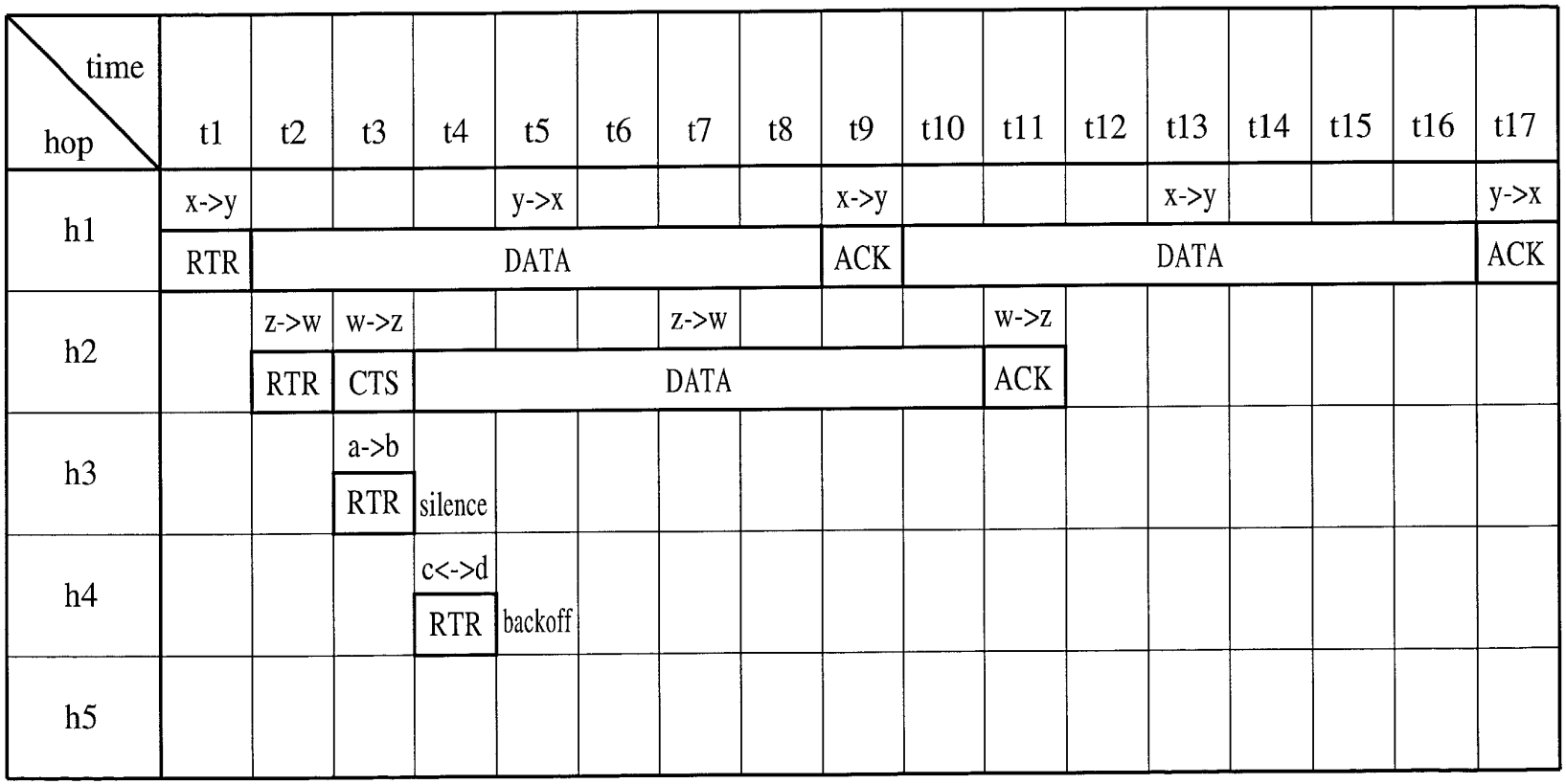
time
hop
t1
t2
t3
t4
t5
t6
t7
t8
t9
t10
t11
t12
t13
t14
t15
t16
t17
h1
x->y
y->x
x->y
x->y
y->x
RTR
DATA
ACK
DATA
ACK
h2
z->w
w->z
z->w
w->z
RTR
CTS
DATA
ACK
h3
a->b
RTR
silence
h4
c<->d
RTR
backoff
h5

FIG. 5

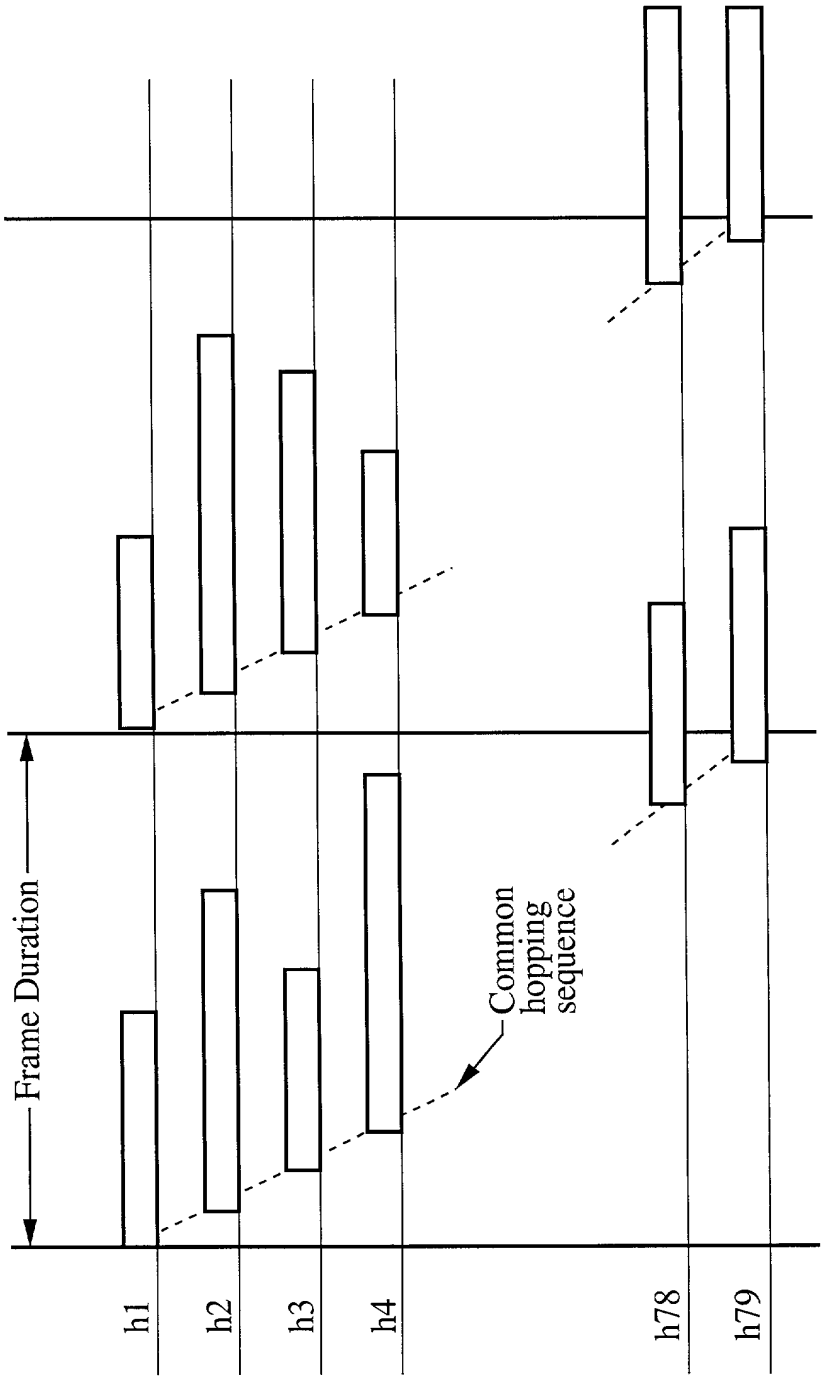

FIG. 6

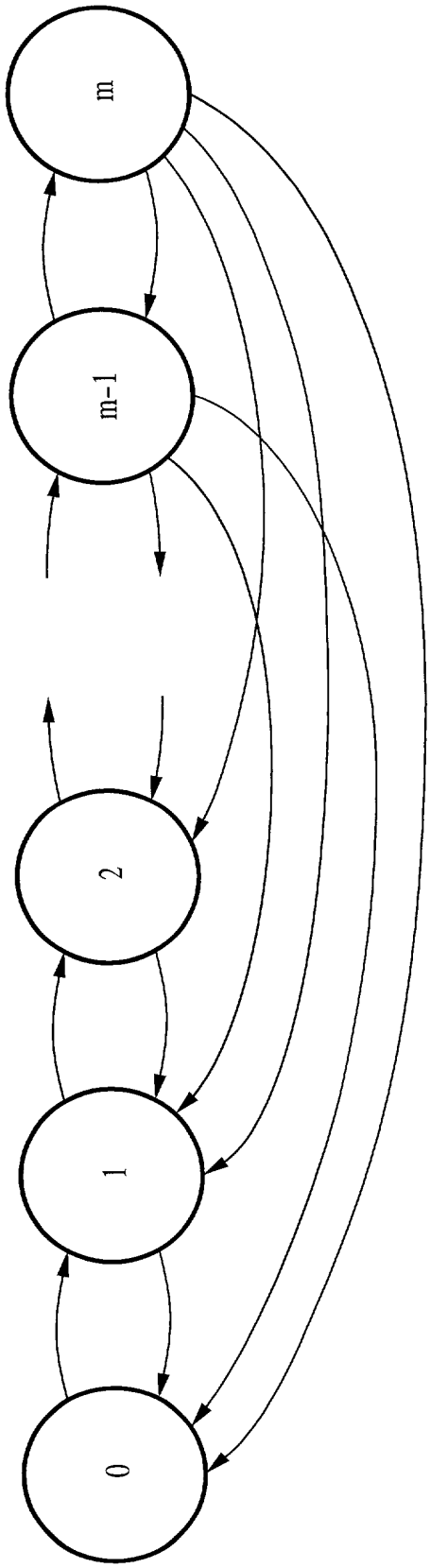

FIG. 7

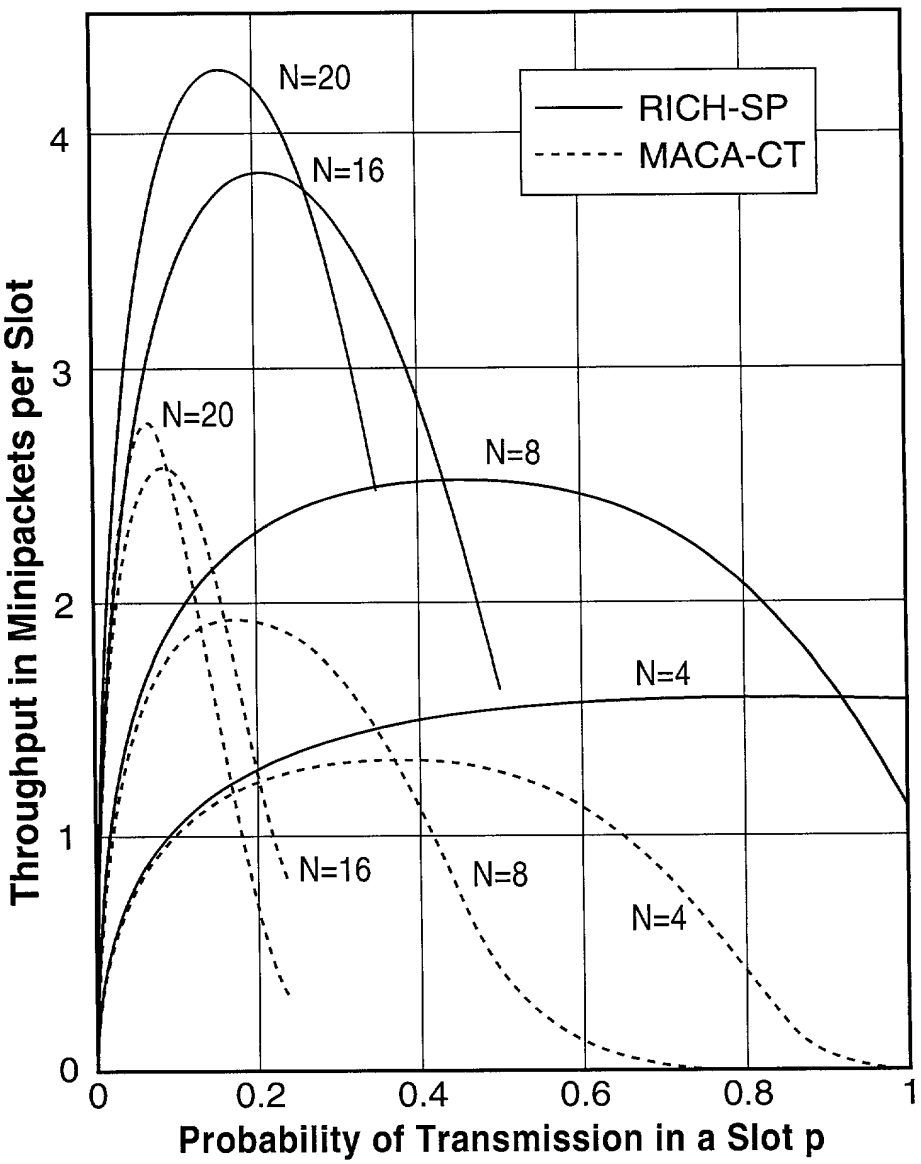
N=20
N=16
RICH-SP
MACA-CT
N=20
N=8
N=4
N=16
N=8
N=4
Throughput in Minipackets per Slot
Probability of Transmission in a Slot p
0
1
2
3
4
0
0.2
0.4
0.6
0.8
1

FIG. 8

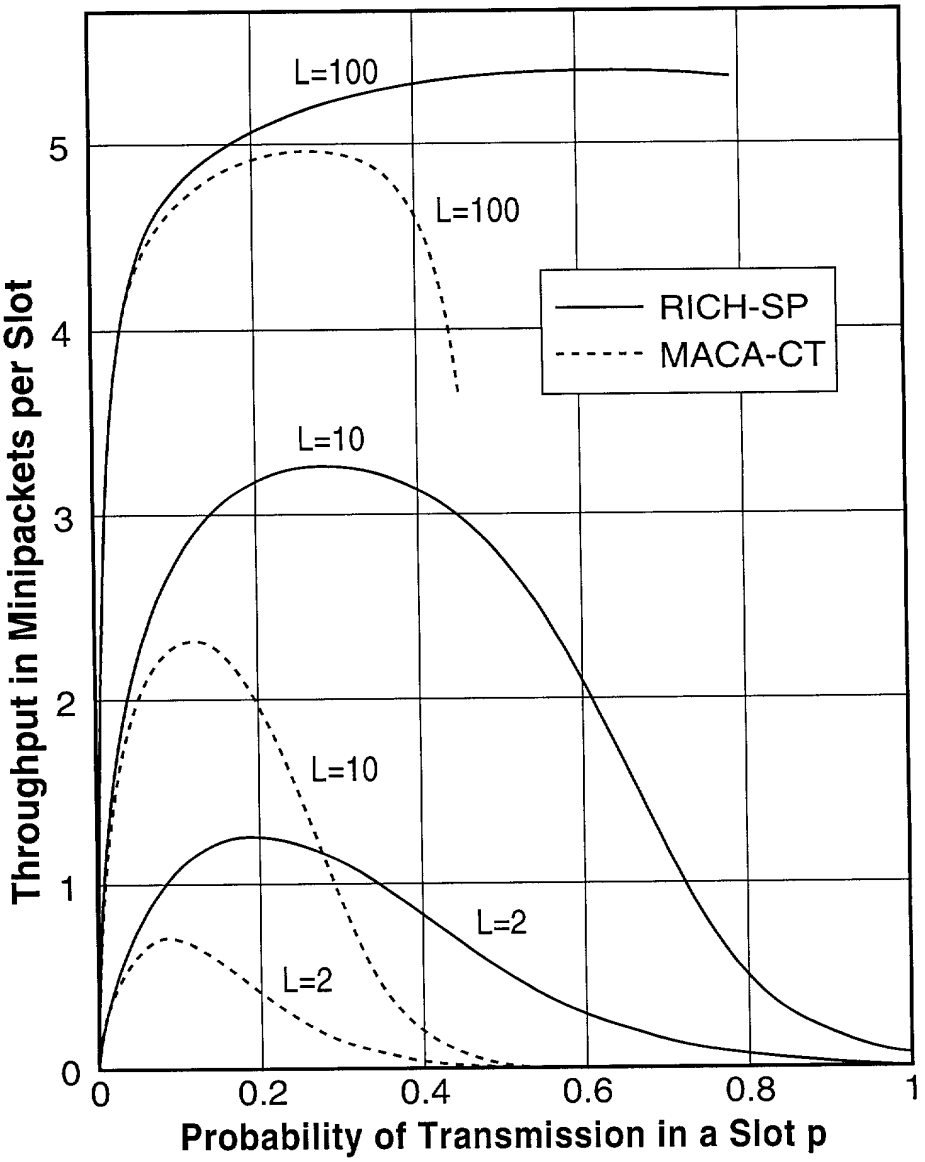
L=100
L=100
RICH-SP
MACA-CT
L=10
L=10
L=2
L=2
Throughput in Minipackets per Slot
Probability of Transmission in a Slot p
0
1
2
3
4
5
0
0.2
0.4
0.6
0.8
1

FIG. 9

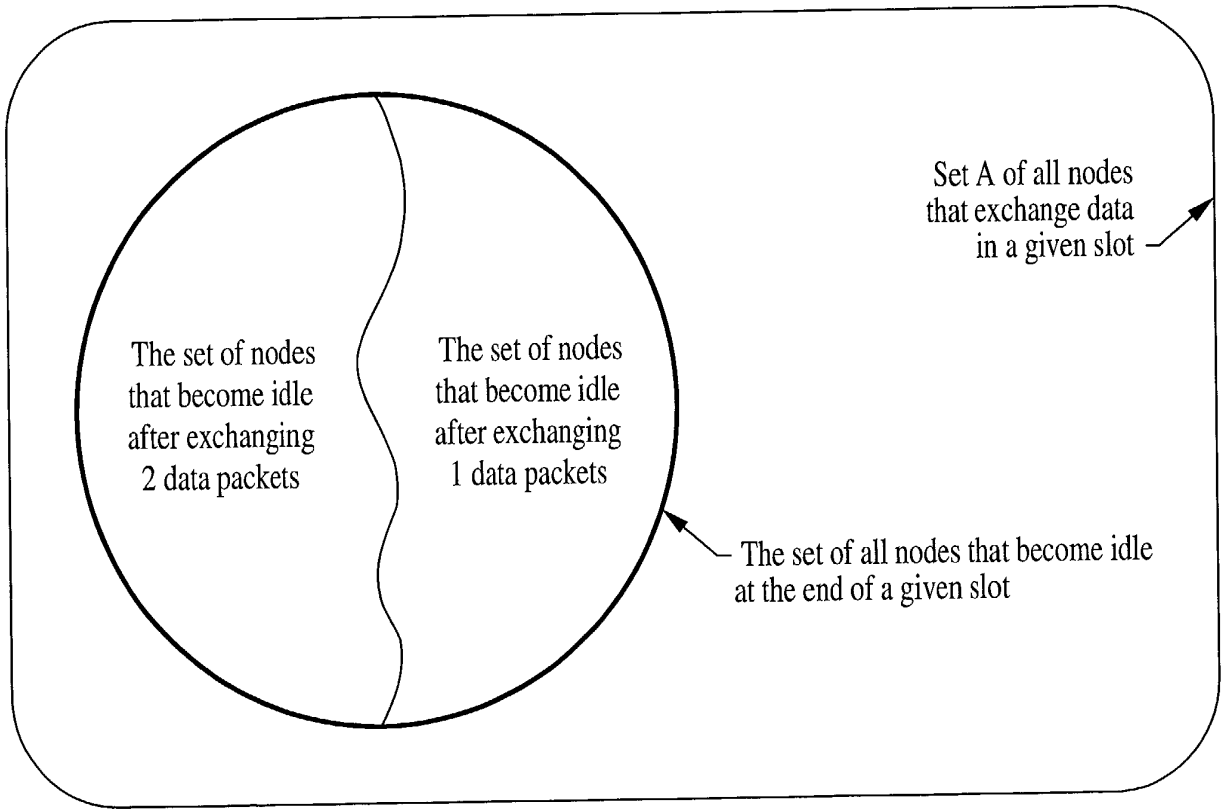
Set A of all nodes
that exchange data
in a given slot
The set of nodes
that become idle
after exchanging
2 data packets
The set of nodes
that become idle
after exchanging
1 data packets
The set of all nodes that become idle
at the end of a given slot

FIG. 10

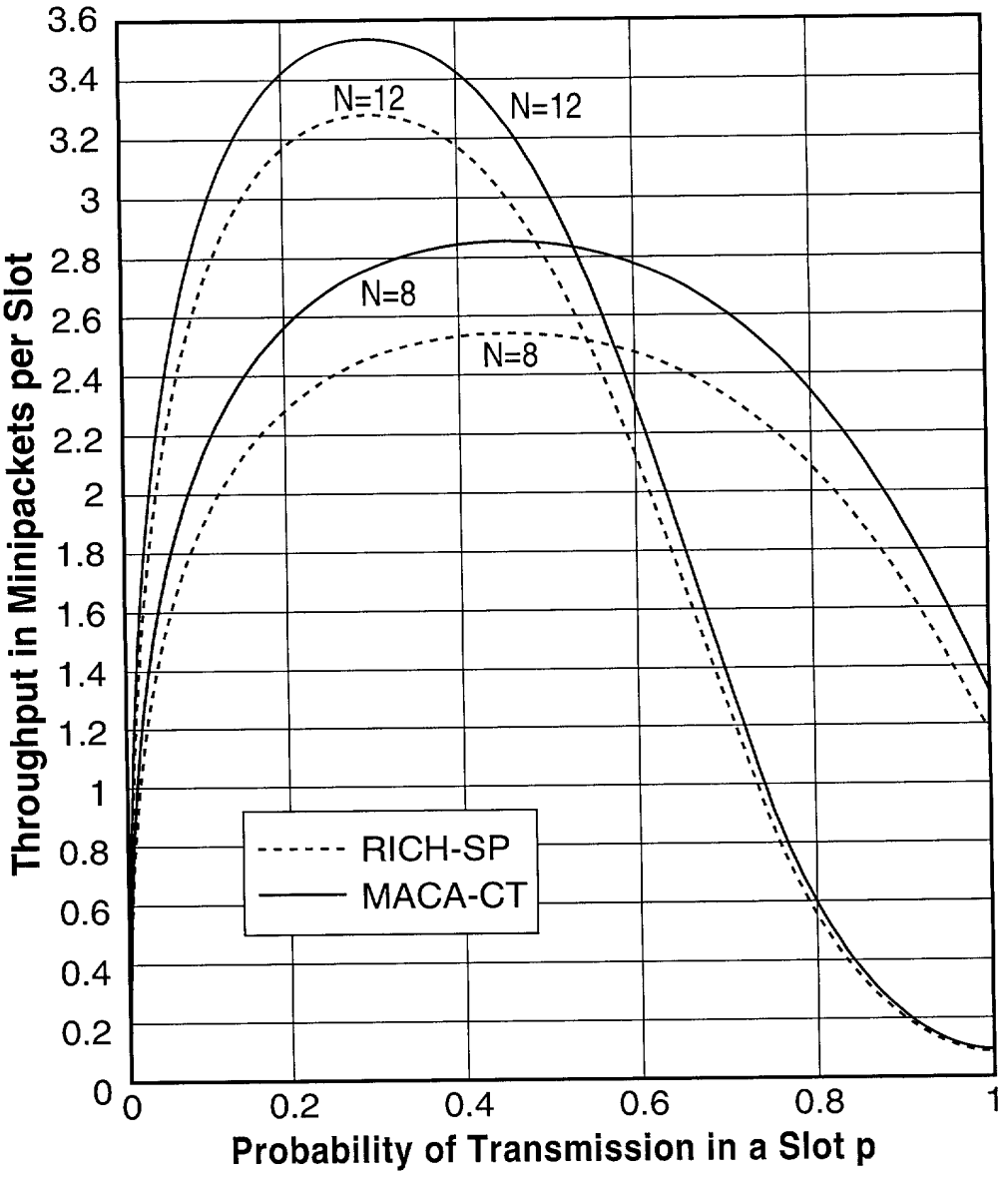
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
0.2
0.4
0.6
0.8
1
N=12
N=12
N=8
N=8
RICH-SP
MACA-CT
Throughput in Minipackets per Slot
Probability of Transmission in a Slot p

FIG. 11

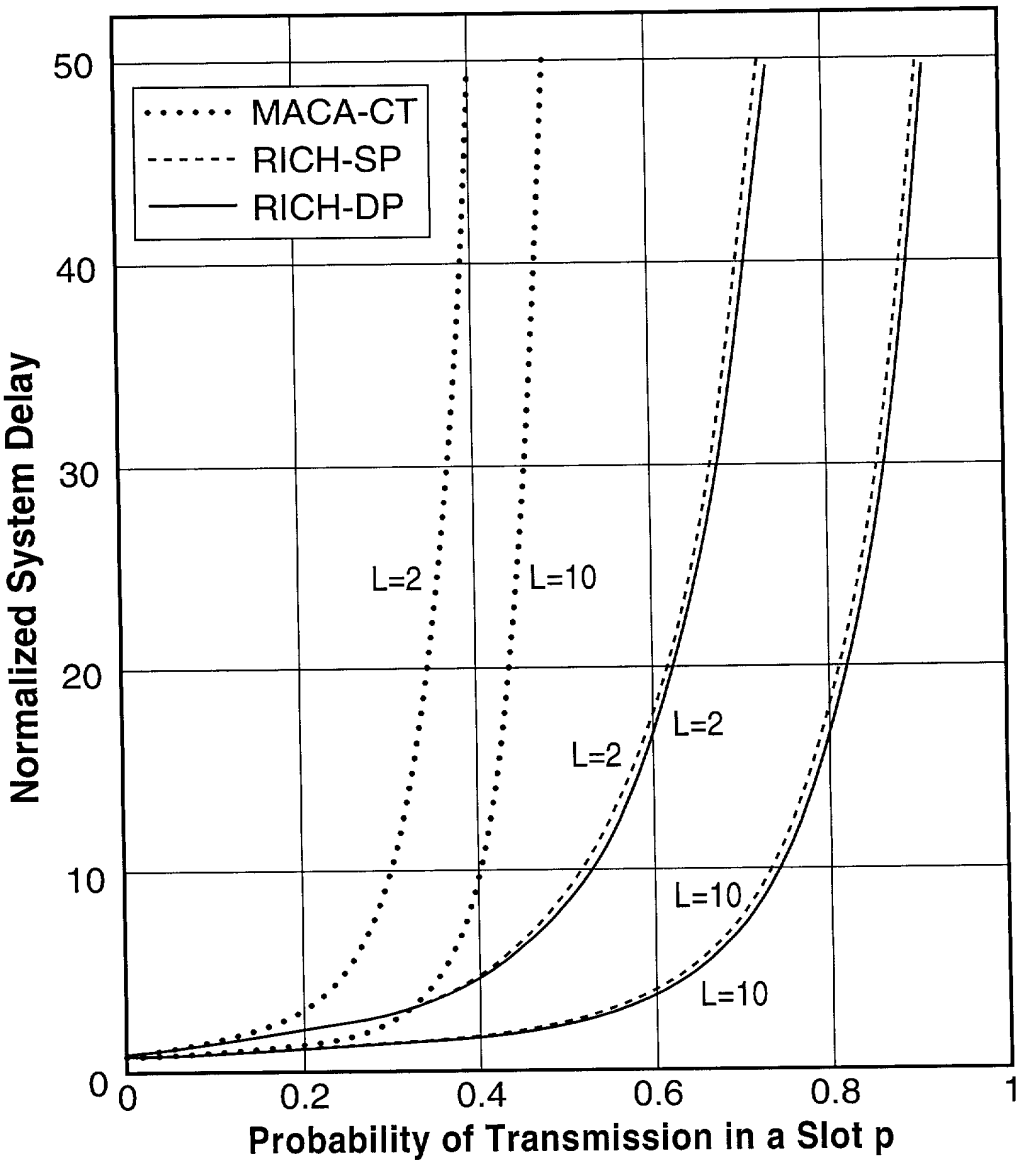
MACA-CT
RICH-SP
RICH-DP
Normalized System Delay
Probability of Transmission in a Slot p
0
10
20
30
40
50
0
0.2
0.4
0.6
0.8
1
L=2
L=10
L=2
L=2
L=10
L=10

FIG. 12

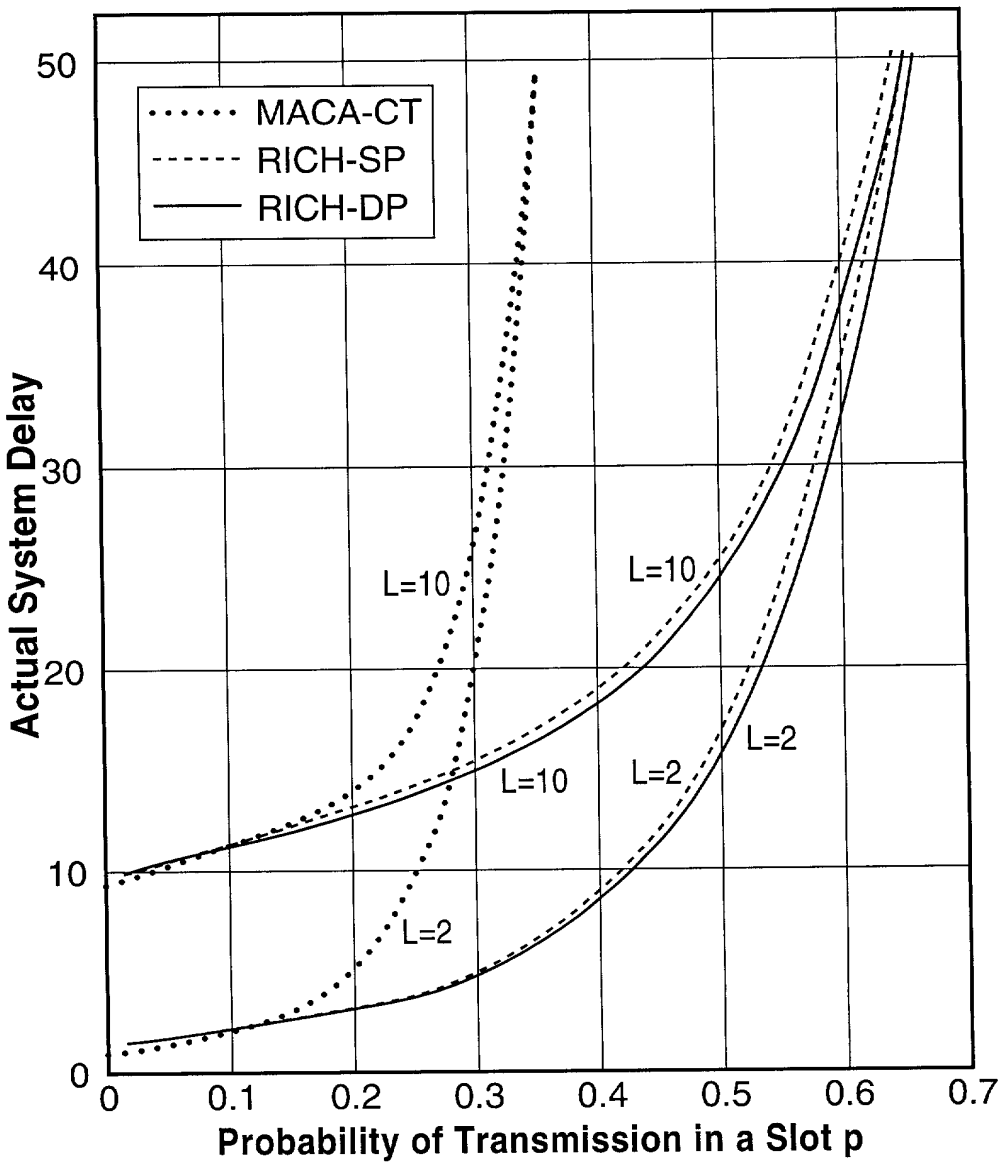
MACA-CT
RICH-SP
RICH-DP
L=10
L=10
L=10
L=2
L=2
L=2
Actual System Delay
Probability of Transmission in a Slot p
0
10
20
30
40
50
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7

FIG. 13

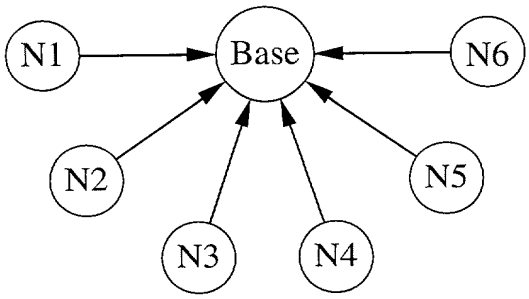

FIG. 14

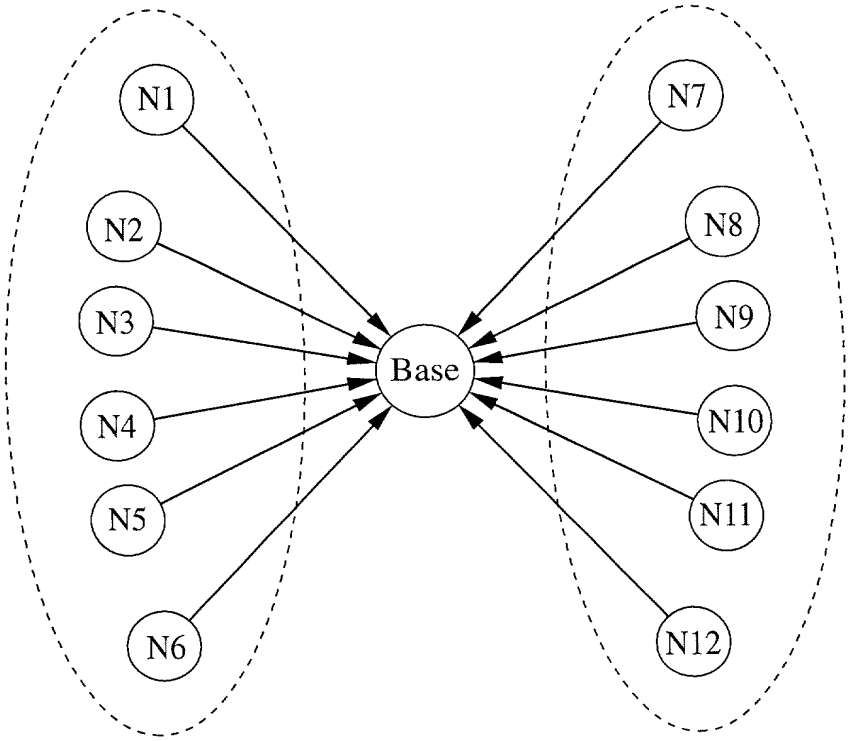

FIG. 15

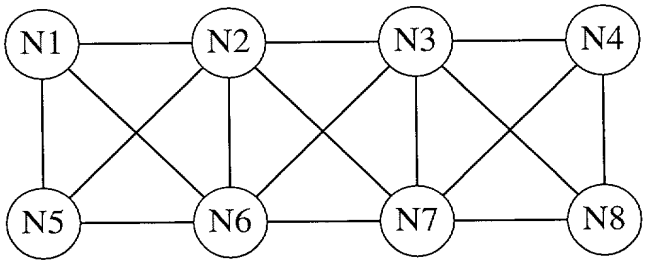

FIG. 16

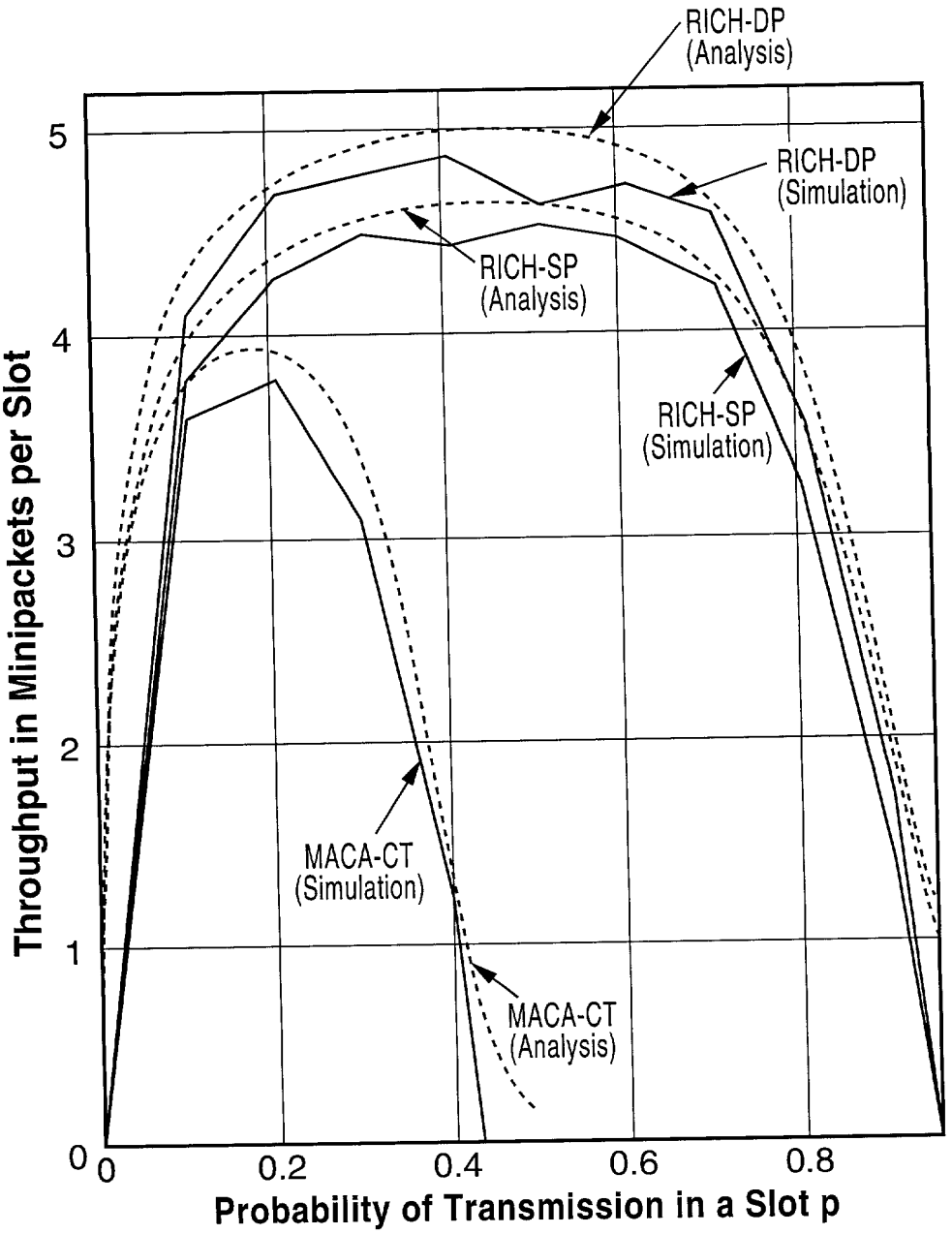
RICH-DP
(Analysis)
RICH-DP
(Simulation)
RICH-SP
(Analysis)
RICH-SP
(Simulation)
MACA-CT
(Simulation)
MACA-CT
(Analysis)
Throughput in Minipackets per Slot
Probability of Transmission in a Slot p
0
1
2
3
4
5
0
0.2
0.4
0.6
0.8

FIG. 17

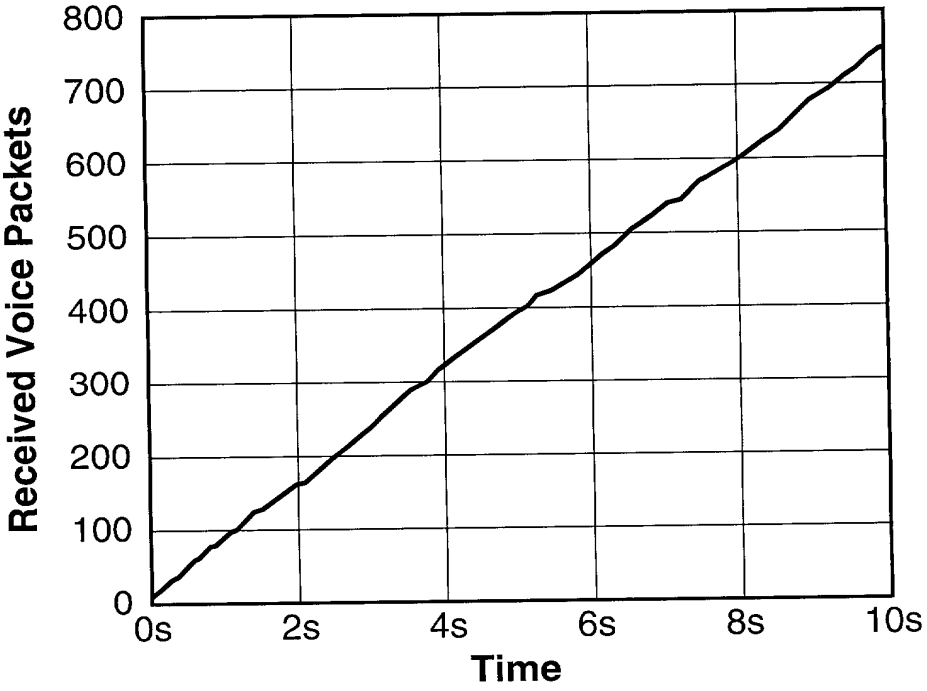
Received Voice Packets
800
700
600
500
400
300
200
100
0
0s
2s
4s
6s
8s
10s
Time

FIG. 18

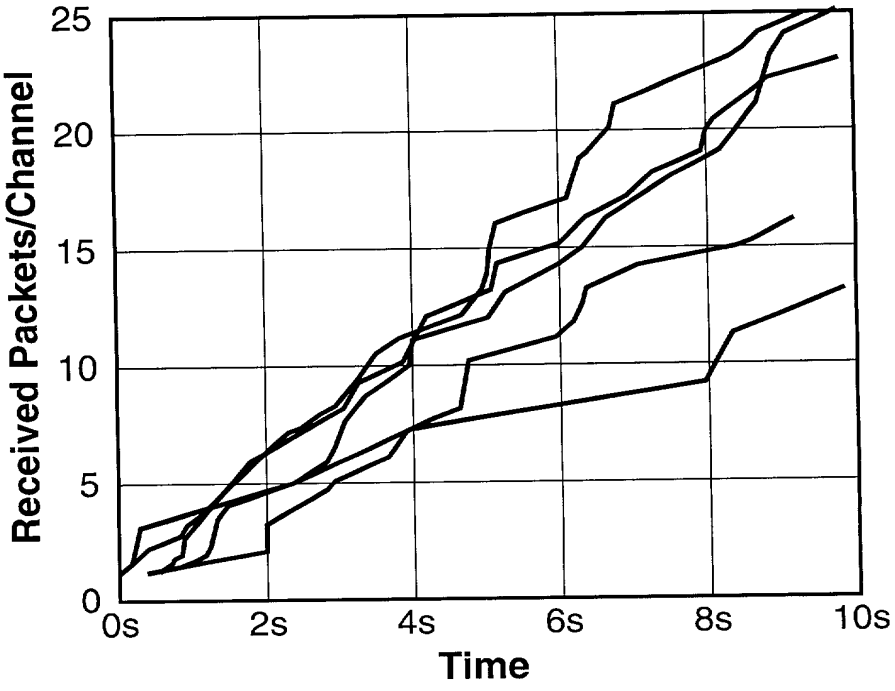
Received Packets/Channel
25
20
15
10
5
0
0s
2s
4s
6s
8s
10s
Time

FIG. 19

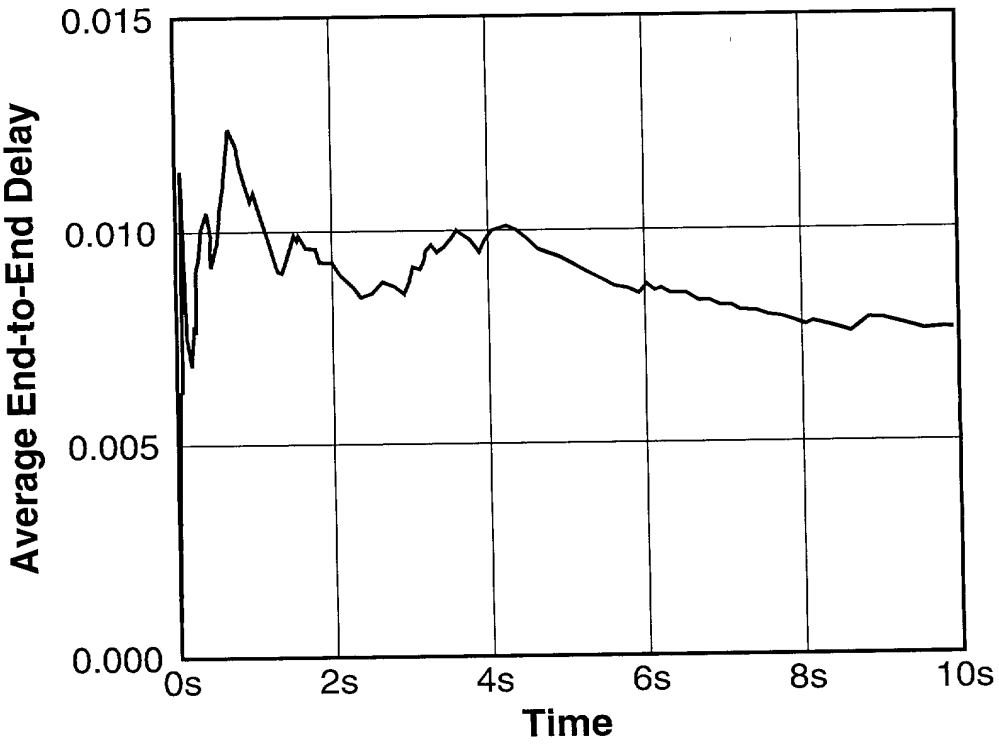
0.015
0.010
0.005
0.000
Average End-to-End Delay
0s
2s
4s
6s
8s
10s
Time

FIG. 20

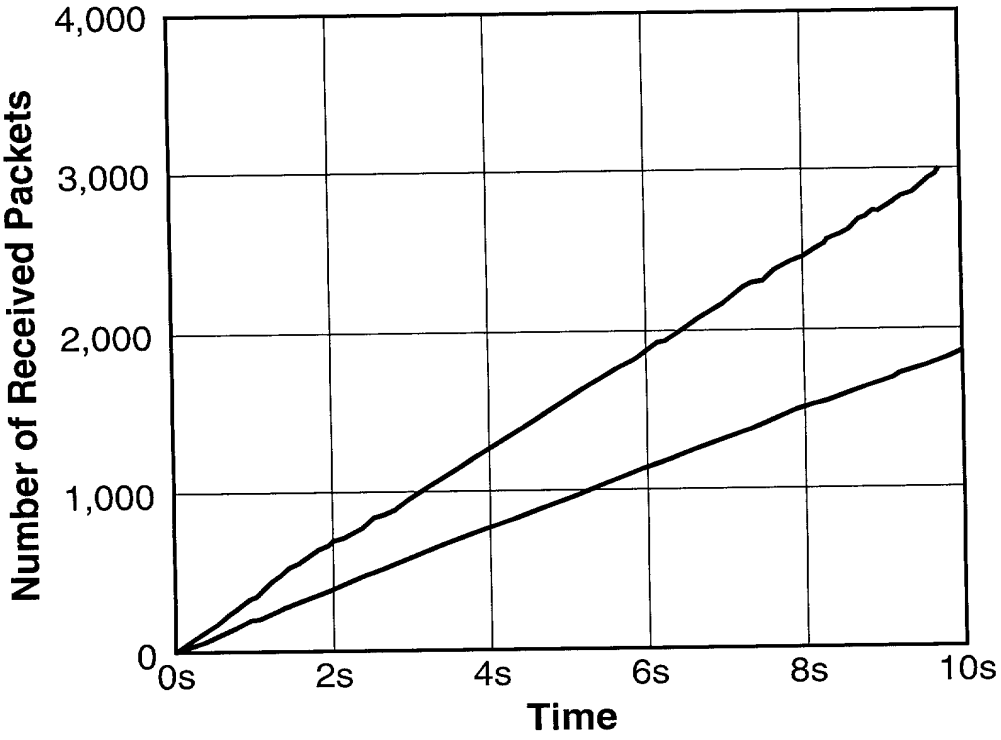
4,000
3,000
2,000
1,000
0
Number of Received Packets
0s
2s
4s
6s
8s
10s
Time

FIG. 21

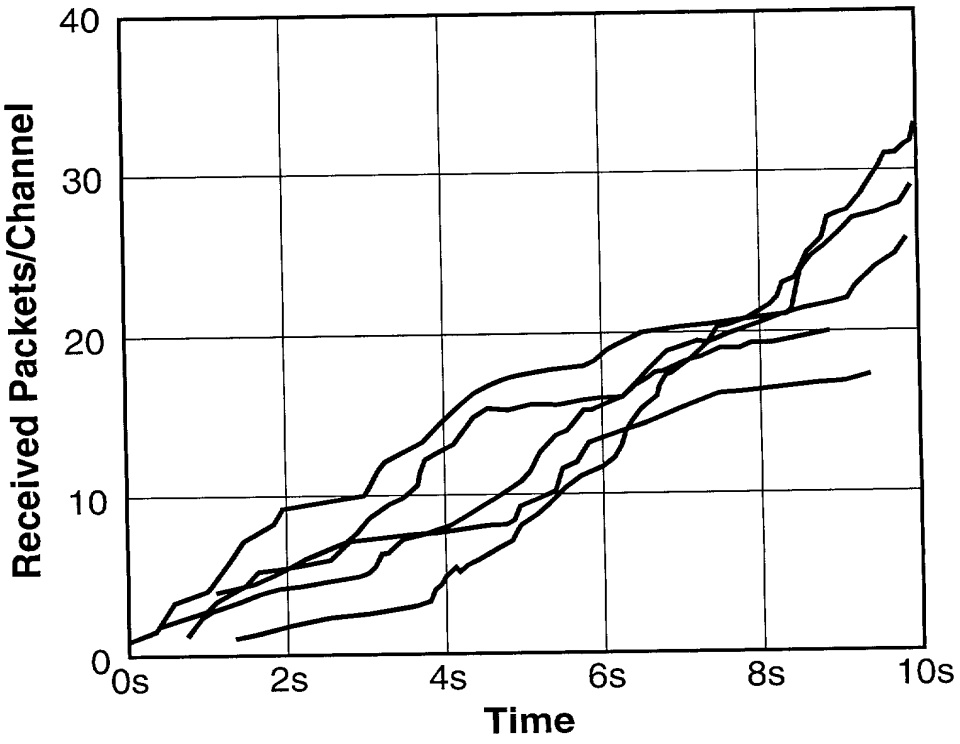
Received Packets/Channel
40
30
20
10
0
0s
2s
4s
6s
8s
10s
Time

FIG. 22

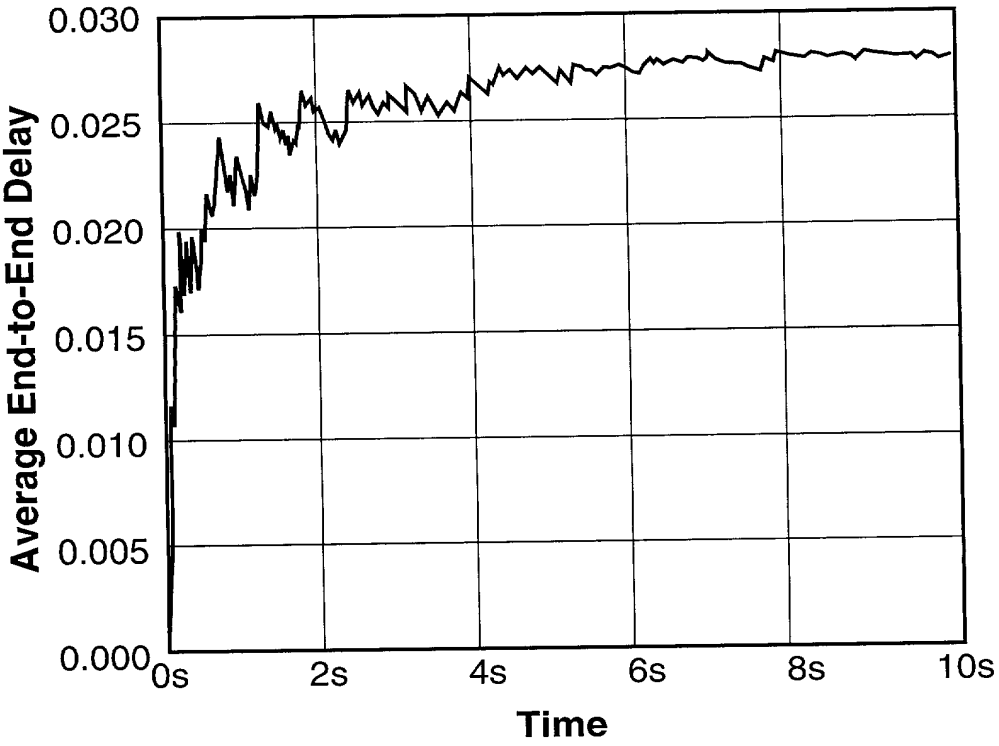
Average End-to-End Delay
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0s
2s
4s
6s
8s
10s
Time

FIG. 23

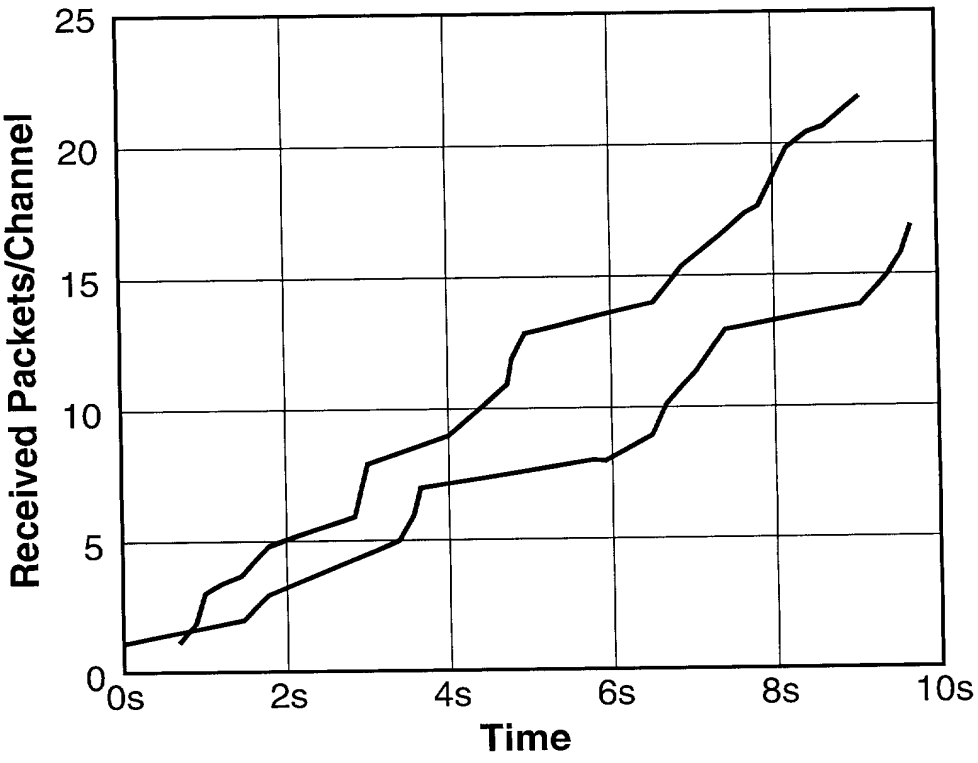
Received Packets/Channel
25
20
15
10
5
0
0s
2s
4s
6s
8s
10s
Time

FIG. 24

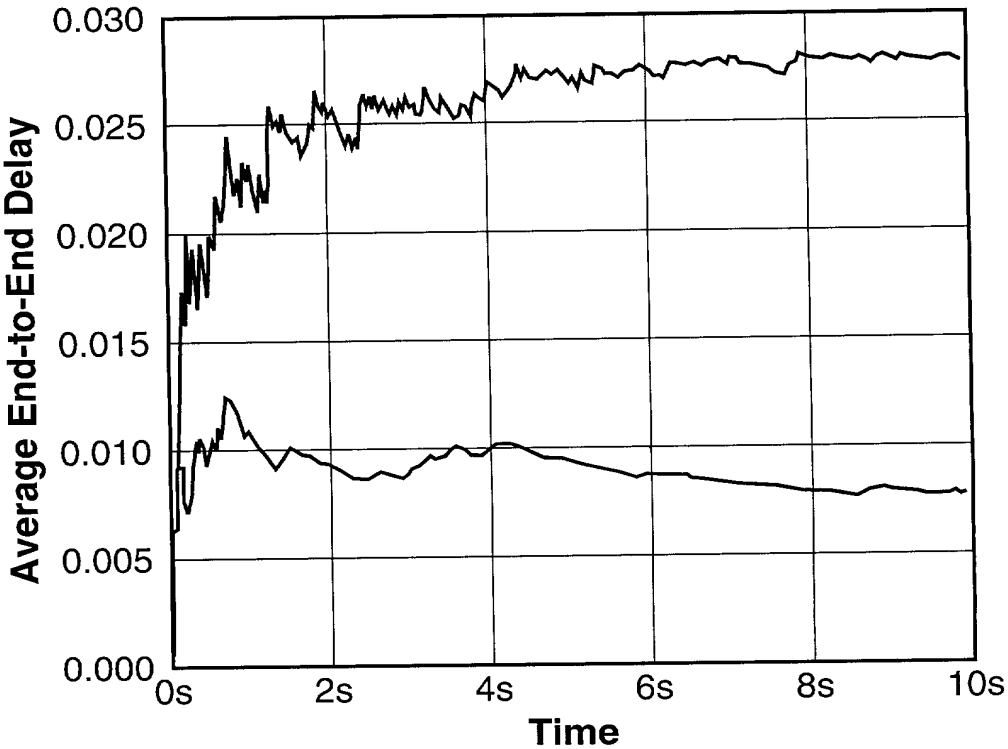
Average End-to-End Delay
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0s
2s
4s
6s
8s
10s
Time

FIG. 25

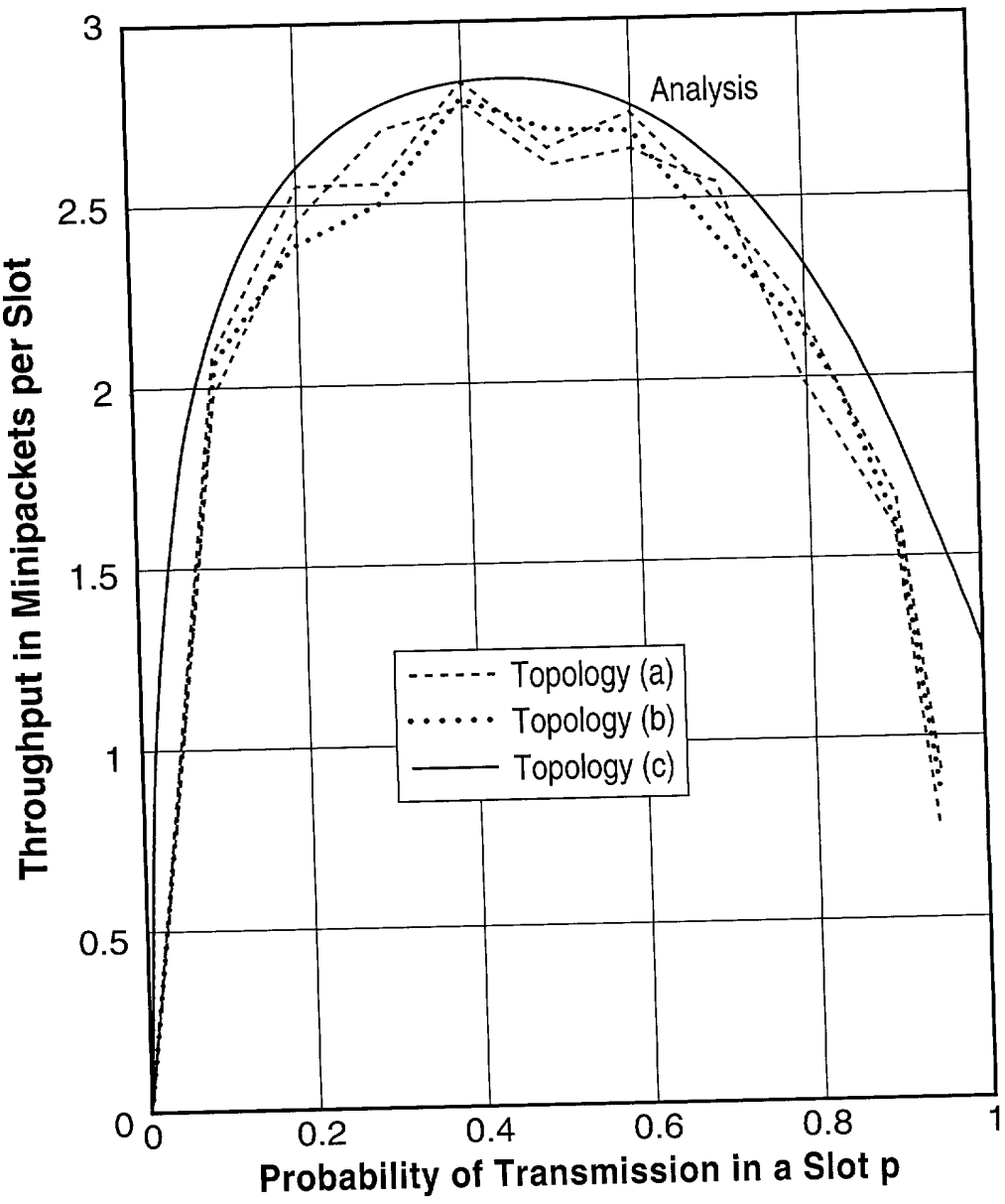
Throughput in Minipackets per Slot
Probability of Transmission in a Slot p
Analysis
Topology (a)
Topology (b)
Topology (c)
0
0.5
1
1.5
2
2.5
3
0
0.2
0.4
0.6
0.8
1

FIG. 26